



Efficiency Standards Office

# Blueprint

Fall 1996, No. 57

## California Energy Commission

### RESIDENTIAL STANDARDS

#### Questions and Answers

**Q** *Can I use single-pane windows or skylights?*

New buildings or additions, using a *performance* approach (points, computer), may be able to achieve compliance with the higher U-value of single-pane glass. The ease or difficulty in making up the lost energy efficiency will depend on the climate zone and building design.

New buildings or additions showing compliance using *prescriptive* standards and alterations (see the next question for a full explanation of *alterations* involving fenestration) are required to meet a maximum U-value for fenestration products. Since this maximum U-value ranges from 0.60 to 0.75, it could preclude the use of single pane glass.

**Q** *Do replacement windows have to meet any specific U-value? When does the 0.75 maximum U-value for fenestration products mentioned in Energy Efficiency Standards, Section 152(b) apply?*

When replacing windows with the same size window opening there is no maximum U-value requirement. If windows are added (new or different size opening) or replaced "as part of an alteration" (Section 152(b)), then the maximum U-value of 0.75 applies. Thus, if an alteration apart from the fenestration change, requires a building permit, then any replaced fenestration within the area being altered must have a maximum U-value of 0.75;

fenestration being replaced in unaltered areas of the house does not need to meet a maximum U-value. For example, if an east wall is being altered at the same time windows on the west are being replaced, only windows affected by the alteration to the east wall must meet the 0.75 maximum U-value requirement.

**Q** *Under what circumstances is a constantly (or continuously) burning pilot light prohibited on certain appliances?*

For compliance with the *Energy Efficiency Standards*, Section 115 prohibits continuously burning pilot lights for some natural gas burning equipment (this does not include liquefied petroleum gas burning appliances). The equipment types are:

- Household cooking appliances with an electrical supply voltage connection in

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## Questions and Answers (continued)

which each pilot consumes 150 Btu/hr or more

- Pool heaters
- Spa heaters
- Fan type central furnaces

Section 150(e) prohibits continuously burning pilot lights for:

- Fireplaces
- Decorative gas appliances
- Gas logs

For compliance with federal and state appliance regulations (which apply to any appliance sold or offered for sale in California), a constant burning pilot light is prohibited on:

- Gas kitchen ranges and ovens with an electric supply cord
- Pool heaters, except those that burn liquefied petroleum gas

**Q** *Some of the windows I'm using have an SHGC value on the label. What is this?*

The National Fenestration Rating Council (NFRC) now has a window rating and labeling system for solar heat gain coefficients (SHGC) in addition to the U-value. SHGC is a measure used by NFRC to rate the solar heat gain properties of an entire fenestration product. SHGC values range from 1.0 to 0, with lower numbers allowing less solar heat gain through the window and into the building. For example, if the goal is to reduce cooling loads, a window with a lower SHGC (e.g., 0.4) would be preferable to a window with a higher SHGC (e.g., 0.7). The opposite is true if the goal is to increase solar gain to reduce winter heating loads.

**Q** *If SHGC is not equivalent to the shading coefficient (SC), how can I use it in my residential calculations?*

You must convert the SHGC into the SC by removing the effects of framing and dividers. This is done by multiplying 0.87 (the 1993 ASHRAE Handbook of Fundamentals value for the center of glass shading coefficient) by

the framing/divider factor (FDF), then dividing the SHGC by the product. Thus:

$$SC_{\text{glass alone}} = \text{SHGC} / (0.87 \times \text{FDF})$$

Fenestration framing/divider factors (from *Residential Manual*, Table G-12) for windows and doors are:

FRAME TYPE	FDF	
	WITHOUT DIVIDERS	WITH DIVIDERS
No frame/greenhouse	1.00	0.92
Metal frame	0.90	0.83
Vinyl frame	0.80	0.74
Wood frame (for windows or doors with more than 50% glazing)	0.76	0.70
Wood frame (for windows or doors with less than or equal to 50% glazing)	0.50	0.46

Example 1: A wood framed window with dividers and low emissivity glazing has a labeled U-value of 0.30 and a labeled SHGC of 0.25. The  $SC_{\text{glass alone}}$  value is  $0.25 / (0.87 \times 0.70) = 0.41$  SC.

Example 2: An aluminum frame window with dividers and clear glass has a labeled U-value of 0.73 and an SHGC of 0.63. The  $SC_{\text{glass alone}}$  value is  $0.63 / (0.87 \times 0.83) = 0.87$  SC.

**Q** *My client wants a dedicated hydronic heating system (space heating only), but a few things are unclear: (1) What piping insulation is required? (2) Can I use any compliance approach? (3) Do I have to insulate the slab with R-10 slab edge insulation? and (4) What special documentation must be submitted for this system type?*

- (1) The supply lines not installed within a concrete radiant floor must be insulated in accordance with Section 150(j)—R-4 on pipes that are 2 inches or less in diameter, R-6 for pipes greater than 2 inches in diameter.

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## Questions and Answers (continued)

- (2) You can use any compliance approach; however, when using a prescriptive compliance approach, the AFUE or HSPF (as determined on the DHW-5) must meet the minimum efficiency of the selected Alternative Component Package. Note: CALRES requires that a boiler be used as the water heating device for a dedicated hydronic system.
- (3) The R-10 slab edge insulation is only required when the distribution system is a radiant floor system (pipes in the slab). When this is the case R-10 insulation, installed to the lesser of 16 inches deep or the depth of the footing, is a mandatory measure (no modeling or credit).
- (4) A DHW-5 worksheet is used to determine the system efficiency (AFUE or HSPF) and must be submitted with other compliance documentation for prescriptive and the hand method of points compliance. As noted in Table 6-2 (*Residential Manual*, page 6-6) approved programs (energy budget and points) perform the water heating calculations internally, so the forms do not need to be submitted.

**Q** *One of my clients wants to use a product that is installed on the hot water pipes and uses electricity to heat the water (in addition to the storage tank). It is not a recirculating system but the end result is the same—no waiting for hot water. The building department told me I need to account for the energy use of this product. How do I include in the compliance calculations?*

There is currently no approved method for accounting for the energy use of a heat cable on water heating pipes. Therefore, it cannot be used in new construction if compliance with the water heating budget is required (*Energy Efficiency Standards*, Section 151(b)(1)).

This product should not be confused with heat tape used for freeze protection. Freeze protection products activate the electric resistance heating tape only when temperatures drop to a point where freezing

of pipes could occur. Freeze protection products are not prohibited by the standards, and need not be included in the water heating compliance calculations. Pipe insulation, whether mandatory or for credit, is still required (*Residential Manual*, p. 6-37).

**Q** *My client is removing a window as part of a bathroom remodel/small addition. Can I take credit for the glazing removed on an addition that is less than 100 ft<sup>2</sup> using a prescriptive compliance approach?*

That depends on which of two prescriptive approaches you use. There are two prescriptive options for additions that are up to 100 ft<sup>2</sup>, one that doesn't allow credit for glazing removed (to make way for the addition) and the other that does allow this credit.

The first prescriptive option allows up to 50 ft<sup>2</sup> (0.75 maximum U-value) of new glazing area (no credit for glazing removed) and requires compliance with only mandatory measures (*Energy Efficiency Standards*, Section 152(a)1.A). The second prescriptive option requires compliance with most of the requirements of Alternative Component Package D or E, except that wall insulation can be at R-13, and glazing U-value must be 0.75 or less. In this second option the glazing area allowed is the percentage in the package, plus the area of glazing removed (Section 152(a)1.B).

**Q** *I have two different duct conditions in an existing plus addition compliance approach using the point system. The existing system is being extended into the addition, which will have R-4.2 insulation on the ducts, but the existing house has no duct insulation. What duct condition do I use in the calculations since there are no values for R-0 duct insulation?*

Use the point value for the predominant duct location and the lowest R-value (*Residential Manual*, p. 4-49). The predominant location is determined as the floor area being served by 50 percent or more of ducts of a given condition. Depending on the age of the house,

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## Questions and Answers (continued)

the existing ducts can be assumed to have either R-2.1 insulation (built before 1992) or R-4.2 (built in 1992 or later) (Table 7-2, page 7-10).

## NONRESIDENTIAL STANDARDS

### Questions and Answers

There are no nonresidential questions and answers in this issue.

## DID YOU KNOW . . . ?

### ARI Directory

... In an agreement with the Air Conditioning and Refrigeration Institute (ARI), the *Directory of Certified Unitary Products* and *Directory of Certified Applied Air-Conditioning Products* are acceptable for determining or verifying compliance with the *Energy Efficiency Standards and Appliance Efficiency Regulations*. Since California requires that a split system efficiency be based on the condenser/coil combination with the highest sales volume, as part of the agreement ARI will prominently display in their directory a statement such as:

“In determining the efficiency of split systems, use the listed efficiency of the highest sales volume tested condenser/coil combinations indicated in the listings.”

In this agreement with ARI, the Commission approved directories published by the Air Conditioning and Refrigeration Institute (ARI) for:

- Unitary Air Conditioners
- Unitary Air-Source Heat Pumps
- Packaged Terminal Air-Conditioners
- Packaged Terminal Heat Pumps
- Water-Source Heat Pumps
- Ground Source Closed-Loop Heat Pumps
- Ground Water-Source Heat Pumps

- Unitary Large Equipment

ARI publishes its directories twice a year. The Unitary Products directory is published in January and July and the Applied Products directory is published in May and October. For appliances not found or not covered in the ARI directories, please consult the Standards Hotline. ARI provides monthly updates to the Energy Commission if you obtain directories in electronic format from the Commission's Bulletin Board System (BBS). Please see *Blueprint* Nos. 54 and 55 or call the Standards Hotline for information regarding electronic access to the Commission's appliance databases.

### GAMA Directory

... The Gas Appliance Manufacturers' Association (GAMA) *Consumers' Directory of Certified Efficiency Ratings for Residential Heating and Water Heating Equipment* directory can now be used to determine or verify compliance with the *Energy Efficiency Standards and Appliance Efficiency Regulations* on some residential appliances.

In an agreement between GAMA and the California Energy Commission, the GAMA directory can be used for gas furnaces, boilers and water heaters and will replace the Energy Commission's Directories of Certified appliances (Sections I and III of the GAMA directory). Specifically excluded from this agreement are Gas Vented Direct Heating Equipment and Combination Water Heaters/Space Heaters (Section II).

Also, the GAMA directory cannot be used for the following products not covered by GAMA:

- 3-phase furnaces
- Furnaces with input  $\geq 225,000$  Btu/hour
- Furnaces with a cooling capacity  $> 65,000$  Btu/hour
- Electric boilers
- Non-electric boilers with input  $\geq 300,000$  Btu/hour
- Non-oil storage water heaters with input

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## DID YOU KNOW . . .? (continued)

> 75,000 Btu/hour and volume < 20 gallons or > 100 gallons

- Oil storage water heaters with input > 105,000 Btu/hour and volume > 50 gallons
- Gas or oil instantaneous water heaters
- Non heat pump electric storage water heater with input > 12 kW and volume < 20 gallons or > 120 gallons
- Heat pump water heaters with input > 24 amperes
- Electric instantaneous water heaters

GAMA publishes its directory twice annually, in April and October, and provides monthly updates electronically to the Energy Commission's Appliance Certification Program. For appliances not found or covered in the GAMA directory, please consult the Standards Hotline. GAMA provides monthly updates to the Energy Commission if you obtain directories in electronic format from the Commission's Bulletin Board System (BBS). See *Blueprint* Nos. 54 and 55 or call the Standards Hotline for information regarding electronic access to the Energy Commission's appliance databases.

### 1998 Rulemaking

... If you've been reading the notices, you know that the Energy Commission recently held meetings to gather comments on changes and improvements to the standards people would like to see made. These meetings were held in Redding, Alhambra and Sacramento. Based on public and staff comment, an Order Instituting Rulemaking was approved at the October 2 Energy Commission business meeting. Workshops on the proposed amendments and technical analysis are underway now. Any amendments that are finally adopted by the Energy Commission and approved by the Building Standards Commission will become effective January 1, 1999.

### FactsLine

... We've had some problems with the phone lines serving the Hotline's new

FactsLine. We apologize for any inconvenience you might have experienced by being unable to access this service. If this is the first you've heard of the FactsLine, keep reading.

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- Roster of Certified Energy Plans Examiners (by geographic location)
- Publications List
- Mailing List Application
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